भा.कृ.अनु.प. – केन्द्रीय पक्षी अनुसंधान संस्थान
ICAR - Central Avian Research Institute

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Post-Harvest Technology

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The basic and applied research in this Division includes egg and poultry meat quality evaluation; development of innovative techniques for their preservation; development of value-added poultry products tailored to market requirements, their packaging and self-life evaluation under different storage conditions; assessement of potent bio- and phyto-contaminants as well as processing and utilization of poultry by-products, etc.This division has a semi-automatic poultry processing unit, rendering unit and its laboratories are well equipped with modern meat/egg processing and analytical equipments.

Research Activities & Achievements

Post-harvest loss assessment:

- Quantitative losses occuring in eggs and market-ready broilers (5-7 weeks) at selected poultry farms, marketing channels (wholesale/ retail), egg processing plant and house-hold consumer's level assessed through random sample survey.

Quality evaluation :

- Carcass characteristics including meat yields as well as meat and egg quality of different genetic stocks of diversified poultry species maintained at the Institute have been carried out.
- Effect of growth hormone and myostatin genes affecting body weight in broilers evinced that fast growing broilers possess relatively less organoleptic quality than normal growing broilers.

Processing:

- Optimum pre-slaughter fasting period and pre-slaughter electrical stunning to address poultry welfare concern during processing, scalding time and temperature combination and chilling methods, etc. for primary processing of poultry have been standardized.

Webmail (icar.gov.in)

Important Links

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Facilities

ABI Centre

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Covid-19 NEW

Feed Sample Analysis

How to Write a Success Story

- Hot deboning, comman salt and polyphosphate treatments of poultry carcasses resulted in energy saving and reductionn in processing time.
- Enzymatic method for the tenderization of meat from spent hens/culled breeding stocks have been evolved.

Preservation:

- Developed preservation technology for poultry meat through curing and/ or smoking, organic acid dip and usage of natural preservatives (extracts of spices and condiments) .
- Optimized oil-coating, referigerated storage and brining of shell eggs for extending their shelf-life.

Value added products:

- A number of value-added meat products such as chicken sausages, patties, nuggets, mixed meat loaf, steak, rolls, cooked meat stock, gizzard snacks, chicken gizzard pickles, chicken skin-meat cutlets, intermediate moisture chicken meat, gizzard and quail meat pickles, etc. as well as egg products viz. albumen flakes, pancake, egg patties, egg pizza, egg crepes, egg roll, egg strips, egg waffles, egg soufflé, egg cutlet, brined and pickled eggs developed and their shelf-life assessed. Over half a dozen processes developed in this regard have been commercilized.
- Processes also optimized for the utilization of low-value carcass components such as skin, gizzard, heart, liver and wings as value-added meat products.
- Developed poultry meat based functional foods.
- Evaluated comparative efficiency of some flexible packaging materials as an alternative to conventional rigid containers, and modified atmosphere packaging for shelf-life extension of convenient poultry products.

Quality assuarance:

- Microbiological quality of poultry meat and processed poultry products assessed.
- Conducted surveillance and optimized PCR based detection techniques for some potent pathogens like *Salmonella enteritidis* and *S. typhimurium*, *E coli*, *Staph aureus* and *Campylobacter* in chicken eggs.
- A few bacterial pathogens in chicken eggs were quantified using Real–Time PCR.
- Antibiotic resistant profile of these pathogens was generated and techniques for decontamination of chicken eggs using generally regarded as safe (GRAS) preservatives were standardized.
- Occurrence of residues of some potent pesticides (BHC, DDT, Elderin, Dieldrin, Chloropyrophos, Monocrotophos, Dichlorovos, etc.), heavy metals (As, Pb, Cd, Mo, etc.) and vety. drugs (tetracycline, enrofloxacin) in samples of meat, liver and adipose tissue of chicken from farm and market samples collected from northern and eastern region of the country was determined and found to be below their respective MRLs.

By-product utilization:

- Conversion of poultry slaughter by-products into feather meal, offal meal and mixed by-product meal optimized and their nutritive value evaluated for incorporation in poultry rations.

- Technique for preparing pet food biscuit for adult dogs and semi-moist patties for pups utilizing poultry slaughter by-products developed, nutritive value evaluated and successful feeding trials conducted.

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Teaching Activity

Course No.	Title of Courses	Theory/ Practical	Course Instructor
PSC 647	Sensory Evaluation of Poultry Products	Theory -1	Dr. A.K. Biswas
PSC 543	Microbiology of Poultry and Poultry Products	Theory-1	Dr. A.S. Yadav
PSC 544	Microbiology of Poultry and Poultry Products	Practical -1	Dr. A.S. Yadav
PSC 541	Fundamentals of Egg and Meat Technology	Theory -1	Dr. A.K. Biswas
PCS 542	Fundamentals of Egg and Meat Technology	Practical -1	Dr. C.K. Beura & Dr. A.K. Biswas
PSC 641	Fresh & Processed Egg Technology	Theory -1	Dr. C.K. Beura
PSC 642	Fresh & Processed Egg Technology	Practical -1	Dr. C.K. Beura & Dr. A.K. Biswas
PSC 643	Fresh & Processed Poultry Meat Technology	Theory -1	Dr. C.K. Beura
PSC 644	Fresh & Processed Poultry Meat Technology	Practical -1	Dr. C.K. Beura & Dr. A.K. Biswas
PSC 645	Packaging & Marketing of Poultry Products	Theory -1	Dr. A.K. Biswas
PSC 646	Packaging & Marketing of Poultry Products	Practical -1	Dr. C.K. Beura & Dr. A.K. Biswas

Technology Developed

Process for tenderization of poultry meat:

To overcome the disposal problem associated with tough meat of spent hens/ culled breeding stock, a simple and cost-effective process for post-slaughter enzymatic tenderization of meat has been developed. Chicken carcasses are soaked for 3 hr in a tenderizing solution containing papain, sodium chloride and polyphosphate to make tough poultry meat tender.

Oil-coating preservation of eggs:

Eggs are spray-coated with edible vegetable oil (groundnut oil)containing anti-oxidant or liquid paraffin. About 7500 eggs can be coated with one litre of oil and such treated eggs can be safely stored for 30 and 120 days at mean ambient (31°C) and refrigeration (5°C) temperatures, respectively.

Process for poultry carcass decontamination using acidified sodium chlorite:

Acidified sodium chlorite (ASC) is a GRAS (generally recognized as safe) food preservative. Chicken carcasses can be dipped in 0.01% ASC solution for 3 min. for effective decontamination against *Salmonella*, *Campylobacter* and cytotoxigenic *E. coli*.

Value added egg products

Pickled eggs: A simple, cost-effective and efficient technology developed for pickling of quail eggs for upto 4 months of storage and marketing at ambient temperature in ready-to-eat form.

Salted Chicken Eggs: A simple technique for preparation of intact salted chicken shell eggs has been developed which obviates the need for using salt prior to serving boiled eggs and hence a convenient product for egg vendors.

Albumen Rings: Albumen rings are egg snack food, prepared by cooking blended egg albumen in ring molds, battering and breading the coagulated albumen prior to deep fat frying. It can be popularized as egg snacks at growing fast food outlets.

Egg Roll: It is a nutritious, tasty and convenient egg product suitable for meals or as snack foods. This product offers a potential market at growing fast food outlets. Egg roll filled with 80% scrambled egg and 20% chicken meat mixture (shallow pan fried) was rated best in flavour, texture and overall acceptability. Egg roll had a refrigerated shelf-life of 8 days in vacuum and 6 days in aerobic pack.

Egg crepe: Egg crepe is a thin, fat, circular product and may be filled with meat or vegetables and rolled or folded. It is an egg-rich product and can be popularized as a convenient egg item at growing fast food outlets and at homes. Crepes has a shelf-life of 22 days in vacuum and 20 days in aerobic packaging at refrigeration (4 ± 1°C) and for 60 days at freezing (-18 ± 1°C) temperature in both vacuum and aerobic packaging.

Egg Waffles: Egg Waffle is a nutritious, light, crispy and versatile snack food for the breakfast. This product offers a potential market at growing fast food outlets. Egg Waffles prepared from 65% liquid whole egg with 10% wheat flour and 5% granulated wheat are most acceptable and has an ambient shelf-life of 4 days in vacuum and 3 days in air packs, while at refrigeration temperature, it can keep well for 10 days in vacuum and 6 days in air packs with satisfactory microbiological quality.

Value added meat products

Cured and smoked chicken: Dressed chickens are brine-cured for 48 hr at 4°C followed by smoking for 4 h at 45°C (R.H. 30%) to produce delicious product having desirable pink colour and typical smoky flavour with longer shelf-life.

Chicken patties: This is a value-added, comminuted chicken product prepared by utilizing the tough meat of culled layers /discontinued breeder stock. Minced meat, fat,binder,condiments and additives are mixed in a homogeniser twice at 15°C to prepare uniform emulsion which is moulded and finally oven-cooked.

Chicken nuggets: This is also a comminuted product from chicken meat based emulsion more or less similar to that of chicken patties and moulded in the form of square or rectangular nuggets.

Intermediate moisture chicken meat: It is self-stable product developed by immersion of diced chicken meat in infusion solution containing humectants followed by partial dehydration in to a semi-moist product which can be safely stored for about 2 months at ambient temperature.

Chicken chunkalona: A delicious ready-to-eat product prepared from a combination of spent hen meat mince (60%) and pre-merinated tender meat chunks of broiler (25%) along with binders, extenders and seasonings.

Chicken meat spread: A spreadable product prepared from a combination of pre-cooked, deboned and minced spent hens meat (85%) in combination with cereal starch, egg yolk, seasoning and permitted food additives followed by thermal processing for gelatinization of starch and stabilization of

emulsified product. The product has a shelf-life of 12 and 60 days under refrigeration (5°C) and frozen (-18°C) storage, respectively.

Marinated chicken breast fillets: A value-added poultry product prepared by tumbling marination of broiler pectoral muscle followed by oven roasting to obtain ready-to-eat product

Vinegar based chicken gizzard pickle: Vinegar based chicken gizzard pickle is a low cost protein rich, chicken fast food with moderately longer shelf-life at ambient temperature (45 days during summer/ rainy season (~34°C); 75 days during winter (~26°C).

Cooked chicken stock (One minute curried chicken): This is a cost effective fast food for instant use by working couples, old people and highly useful at times of instant need.

Mixed Chicken Loaf: The technology offers relatively low cost, easy to process and cost effective fast food.

Cooked Chicken Roll: Cooked Chicken Roll is a novel, ready to consume fast food requiring mild warming before use.

Pet food

Poultry by-products based pet food: Highly nutritious pet food biscuits prepared from a combination of poulty slaughter by-products(excluding feathers), damaged egg liquid, bakery waste, mixed cereal flour, soybean oil and permitted food additives with a shelf-life of 4 months at ambient temperature.

Some other technologies standardized for value added poultry products:

Poultry meat products	*Egg Products*
Tandoori quail	Egg strips
Chicken sausage	Egg souffle
Chicken skin-meat cutlets	Egg cutlet
Chicken steaks	Egg pancake
Dehydrated chicken soup mix	Egg Tikka
Shami chicken kabab	
Fried chicken wings	
Gizzard snacks	
Quail meat pickle	

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Processing and Marketing Unit

The main activities of this unit are to process and market research by-products viz. eggs, dressed poultry and some processed poultry products.

Technologies Commercialized

1. Method of preparing Salted chicken eggs
2. Method of preparing Quail egg pickle
3. Method of preparing Mustard oil based chicken gizzard pickle
4. Method of preparing Vinegar based chicken gizzard pickle
5. Method of preparing Cooked chicken stock (One minute curried chicken)
6. Method of preparing Mixed chicken meat loaf

7. Method of preparing Cooked chicken roll

Pickled eggs: A simple, cost-effective and efficient technology developed for pickling of quail eggs/chicken eggs for storage and marketing at ambient temperature in ready-to-eat form.		**Salted chicken eggs:** Preparation of salted chicken eggs technology is so simple to be used by unskilled people including housewives.	
Albumen rings: Albumen rings are egg snack food, prepared by cooking blended egg albumen in ring molds and battering and breading the coagulated albumen prior to deep fat frying.		**Egg roll:** It is a nutritious, tasty and convenience egg product suitable for meals or as snack foods.	
Egg crepe: Egg crepe is a thin, fat, circular product and may be filled with meat or vegetables and rolled or folded.		**Chicken nugget:** This is a value-added chicken product prepared by utilizing the tough meat of culled layers / discontinued breeder stock.	

Marinated chicken breast fillets: A value-added poultry product prepared from tumbling marination of broiler pectoral muscle followed by oven roasting to obtain ready-to-eat product.		**Intermediate moisture chicken meat:** A shelf-stable convenience poultry meat product developed from diced chicken meat and soaking in infusion solution containing humectants followed by mild thermal treatment for storage and marketing at ambient temperature.	
Chicken Gizzard Pickle: Vinegar based chicken gizzard pickle is a low cost, low calorie, protein rich chicken fast food with moderately longer shelf-life at room temperature (45 days during summer/rainy season and 75 days during winter season.		**Pet food:** Highly nutritous,self-stable biscuits prepared from a combination of poultry slaughter by-products, leaker egg liquid, cereal, edible oil and permitted food additives for adult pet dogs. The product has self- life of about 6 months at ambient temperature.	

Faculty Profile

1.	Dr. A.S. Yadav	***Principal Scientist & Head***
2.	Dr. C.K. Beura	Principal Scientist
3.	Dr. A.K. Biswas	Senior Scientist